

THAT WHICH IS CLAIMED:

1. A method for launching an aircraft having an envelope for receiving a lift gas that is lighter than air, the method comprising:
  - 5 providing the aircraft with a second gas in the envelope, the second gas being heavier than the lift gas;  
introducing the lift gas into the envelope of the aircraft so that the aircraft is buoyant and the envelope is substantially full of a combination of the lift gas and the second gas, the lift gas and the second gas being substantially separate in the envelope  
10 with a mixed gas formed by the lift and second gases therebetween;  
releasing the aircraft so that the aircraft ascends; and  
venting the second gas from the envelope.
2. A method according to Claim 1 wherein said providing step comprises  
15 providing air as the second gas in the envelope.
3. A method according to Claim 1 wherein said introducing step comprises introducing helium into the envelope as the lift gas.
- 20 4. A method according to Claim 1 wherein said introducing and releasing steps comprise releasing the aircraft with a center of buoyancy being between the center of gravity of the aircraft and a first longitudinal end of the aircraft such that the first end of the aircraft is oriented above a second distal end of the aircraft while the aircraft ascends.  
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5. A method according to Claim 4 wherein said introducing and releasing steps comprise releasing the aircraft such that an axis of the envelope extending between first and second ends thereof is oriented at an angle of at least about 45 degrees relative to horizontal while the aircraft ascends.

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6. A method according to Claim 1 further comprising:  
providing at least one mast for supporting the aircraft;  
securing the aircraft to the at least one mast; and  
raising a first end of the aircraft to an elevation higher than a second distal end  
5 of the aircraft such that a longitudinal axis of the aircraft extending between the first  
and second ends is inclined at an angle relative to horizontal.
7. A method according to Claim 6 wherein said raising step comprises  
connecting a buoyant balloon to the first end of the aircraft such that the balloon lifts  
10 the first end of the aircraft.
8. A method according to Claim 6 wherein said raising step comprises at least  
partially filling a gas bag in the envelope with the lift gas such that the gas bag lifts  
the first end of the aircraft.  
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9. A method according to Claim 6 wherein said securing step comprises securing  
the first and second ends of the aircraft to first and second masts such that the  
longitudinal axis of the aircraft is substantially horizontal.
- 20 10. A method according to Claim 6 wherein said raising step comprises at least  
partially filling the envelope with the lift gas and releasing the first end of the aircraft  
such that the lift gas raises the first end of the aircraft.
11. A method according to Claim 6 further comprising rollably moving at least  
25 one of the masts after said securing step.
12. A method according to Claim 1 wherein said introducing step comprises  
injecting the lift gas through a tubular channel extending into the envelope and  
proximate an upper portion of the envelope to minimize mixing of the lift gas in the  
30 envelope.
13. A method according to Claim 1 further comprising at least partially venting  
the lift gas from the envelope and receiving air in the envelope such that the aircraft  
descends with the envelope in a substantially filled configuration.

14. A method according to Claim 13 further comprising repeating said introducing, releasing, and first and second venting steps in order to repeat the launching of the aircraft.

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15. A method for launching an aircraft having an envelope for receiving a lift gas that is lighter than air, the method comprising:

introducing the lift gas into the envelope of the aircraft so that the aircraft is buoyant and the lift gas is substantially separate from a second gas in the envelope;

10 releasing the aircraft such that a longitudinal axis of the envelope extending between first and second distal ends thereof is oriented at an angle of at least about 45 degrees relative to horizontal while the aircraft ascends; and

venting gas from the envelope as the aircraft ascends.

15 16. A method according to Claim 15 wherein said introducing step comprises introducing helium into the envelope as the lift gas.

17. A method according to Claim 15 wherein said venting step comprises venting air from the envelope such that the envelope maintains a substantially constant  
20 volume.

18. A method according to Claim 15 further comprising connecting a buoyant balloon to the first end of the envelope such that the balloon lifts the first end of the envelope.  
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19. A method according to Claim 15 further comprising providing a gas bag in the envelope and at least partially filling the gas bag with the lift gas such that the gas bag lifts the first end of the aircraft.

30 20. A method according to Claim 15 further comprising at least partially filling the envelope with the lift gas such that the lift gas raises the first end of the envelope, rotating the longitudinal axis of the envelope from a generally horizontal orientation to an angle of at least about 45 degrees relative to horizontal.

21. A method according to Claim 15 wherein said introducing step comprises injecting the lift gas through a tubular channel extending into the envelope and proximate an upper portion of the envelope to minimize mixing of the lift gas in the envelope.
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22. A method according to Claim 15 further comprising at least partially venting the lift gas from the envelope and receiving air in the envelope such that the aircraft descends with the envelope in a substantially filled configuration.
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23. A method according to Claim 22 further comprising repeating said introducing, releasing, and first and second venting steps in order to repeat the launching of the aircraft.
24. An apparatus for launching an aircraft having an envelope extending
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- longitudinally between first and second ends and configured to receive a lift gas that is lighter than air, the apparatus comprising:
- first and second masts configured to be connected to the first and second ends of the envelope such that said masts support the aircraft therebetween, at least one of said masts being rotatably connected to the envelope such that the envelope is
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- rotatable to an inclined orientation when the other of said masts is disconnected from the envelope; and
- a gas injection tube configured to extend from a gas source to a location proximate to an upper portion of the envelope, thereby delivering the lift gas from the gas source to the envelope.
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25. An apparatus according to Claim 24 further comprising a gas source configured to supply helium to the envelope via said gas injection tube.
26. An apparatus according to Claim 24 further comprising a lift device
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- configured to connect to the first end of the envelope and lift the first end of the envelope when said first mast is disconnected from the envelope such that said envelope is rotated to an inclined orientation.

27. An apparatus according to Claim 26 wherein said lift device is a buoyant balloon at least partially filled with a gas lighter than air.
28. An apparatus according to Claim 24 wherein said first and second masts are  
5 rotatably connected to the envelope such that the envelope can be rotated about an axis generally parallel to a longitudinal axis of the envelope.
29. An apparatus according to Claim 24 wherein each of said first and second masts are rollably movable such that the aircraft supported therebetween can be  
10 transported.
30. An apparatus according to Claim 24 wherein said gas injection tube is disposed within the envelope of the aircraft and extends between a port in the envelope and the upper portion of the envelope.